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contact, but separated by a thin layer of cytoplasm. as mentioned by Miss FERGUSON.[3]

In *fig. 5* the second pollen tube is evidently on its way to the smallest of the three archegonia, and is taking its way laterally through the tissue of the prothallus instead of down the canal leading to the neck.

The third archegonium is apparently sunken in the tissues of the prothallus, but unfortunately the series is incomplete, and it may have only a very obliquely placed neck. For the same reason it is impossible to say whether this proembryo is really parthenogenetic, as it appears to be.—W. T. SAXTON, *South African College, Cape Town.*

CARNATION ALTERNARIOSE[4]

(WITH EIGHT FIGURES)

To a leaf-and-stem disease of the cultivated carnation, *Dianthus Caryophyllus* L., our attention was called by local florists as causing serious damage. The disease, upon examination, proved to be one hitherto undescribed and a laboratory study of it was undertaken.[5]

Symptoms.—The disease manifests itself as spots, mostly upon the leaves, sometimes upon the stems, especially at the nodes. These spots are strikingly characteristic, of ashen whiteness, with the center occupied by an often scanty, though sometimes profuse, black fungous growth. The diseased spot is dry, somewhat shrunken, thinner than healthy portions of the leaf, approximately circular, though often somewhat elongated in the direction of the longitudinal axis of the leaf (*fig. 1*). When occurring at the node, the disease usually involves the bases of both of the leaves, as well as the stem between them (*fig. 2*). As these nodal spots age, the disease penetrates through the stem, killing its tissue, which shrinks some-

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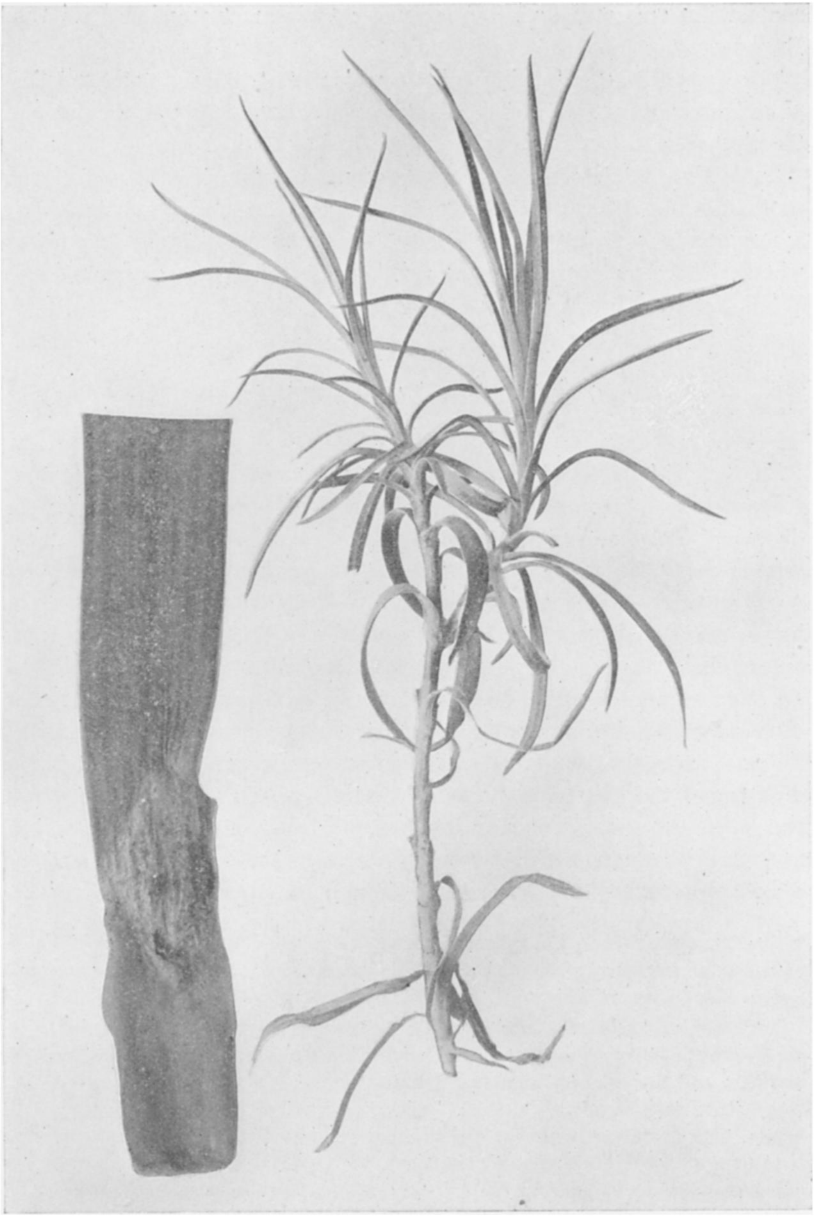
[3] FERGUSON, M. C., Contributions to the knowledge of the life-history of Pinus, with special reference to sporogenesis, the development of the gametophytes and fertilization. Proc. Washington Acad. Sci. **6**:1–202. *pls. 1–24.* 1904.

[4] This termination was suggested by the authors in Annales Mycologici **7**:49. 1909, with the following explanation: "We believe that much will be gained both in clearness and brevity by designating diseases in plants by the uniform termination 'ose' (Lat. *osus*, signifying 'full of') added as a suffix to the genus of the causal fungus, with or without elision of the ultimate syllable of the generic name, in whole or in part, as may be determined by euphony."

[5] Through the kindness of Dr. W. A. ORTON of the U. S. Department of Agriculture, B. P. I., we learn that a Macrosporium disease of carnation was reported from Strassburg, Pa., in 1906, and one attributed to Alternaria from Connecticut by CLINTON in the same year.



1 2

FIG. 1. Single leaf showing diseased spot near base.—FIG. 2. Diseased plant showing removal of lower leaves by the gardener in his efforts to stop the progress of the disease.

what and becomes soft and disintegrated, resulting in the death of the more distal portions of the plant.

Variety of carnations affected.—A striking feature of this disease is its tendency to infect to a large degree one variety, the Mrs. Thomas W. Lawson, to the exemption of others. In all cases which have come to our notice, it has been this variety solely which was diseased; moreover, the only records that we find of the disease imply the same susceptibility.[6]

The causal fungus.—Throughout the diseased tissue of all spots occurs in great abundance a characteristic, dark, branching, septate mycelium (*fig. 3*). The surfaces of diseased spots in periods later than their earliest youth present an abundance of black cespitose hyphae arising from the stomata (*fig. 4*). Spores of the Alternaria type are found in abundance (*figs. 5, 6*), both *in situ* upon these hyphae, and strewn over the surface of the diseased spots between the hyphal bases. The character and arrangement of the hyphae are shown in *figs. 7* and *8*. This fungus was constantly associated with the disease, and no other fungus was found. The presumptive evidence was therefore very strong that this fungus was the cause of the disease. In view of the often saprophytic habit of Alternaria, conclusions on this point would not be valid without evidence from inoculations.

Inoculations.—The fungus was easily isolated by direct transfer of spores from the diseased spots to carnation-leaf agar plates.

On October 27 numerous inoculations were made upon two plants under bell jars, using small pieces of agar, bearing spores and mycelium. One of the plants was left uninjured and the inoculum was placed in the axils of the leaves; in the majority of these cases the inoculations resulted in infection. The other plant was injured by the prick of a needle at the point of inoculation. In these cases about two-thirds of the inoculations were successful. Inoculations with spore suspension were also made upon five branches each, of two other plants, and each was covered by a large test-tube plugged around the stem with cotton to preserve a humid atmosphere. As in the former cases, the inoculations on one plant were at injured points, and those on the other plant were at uninjured points. The results from these spore inoculations were the same as in the cases of inoculations with agar blocks. When these inoculations were made, others were made upon six other plants from the same spore suspensions, but the plants were not covered or injured in any way. Following these last inoculations no signs of the disease were seen. It seems from these experiments that the injured plant is readily susceptible to infection, as is also the uninjured plant if kept in humid condition, but that the uninjured plant in a relatively dry atmosphere is difficult or impossible to infect. In case of successful inoculation, the diseased spots were well developed at the end of a week. The removal of the protecting bell jar from plants already infected resulted usually in cessation of development of the spot. These facts agree well with the field observation that the most damaging infection occurs at the leaf axils, points well adapted to collect and hold water, thus providing conditions for optimum development of the fungus.

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[6] ORTON, W. A., Yearbook, U. S. Dept. Agric. **1905**:611.

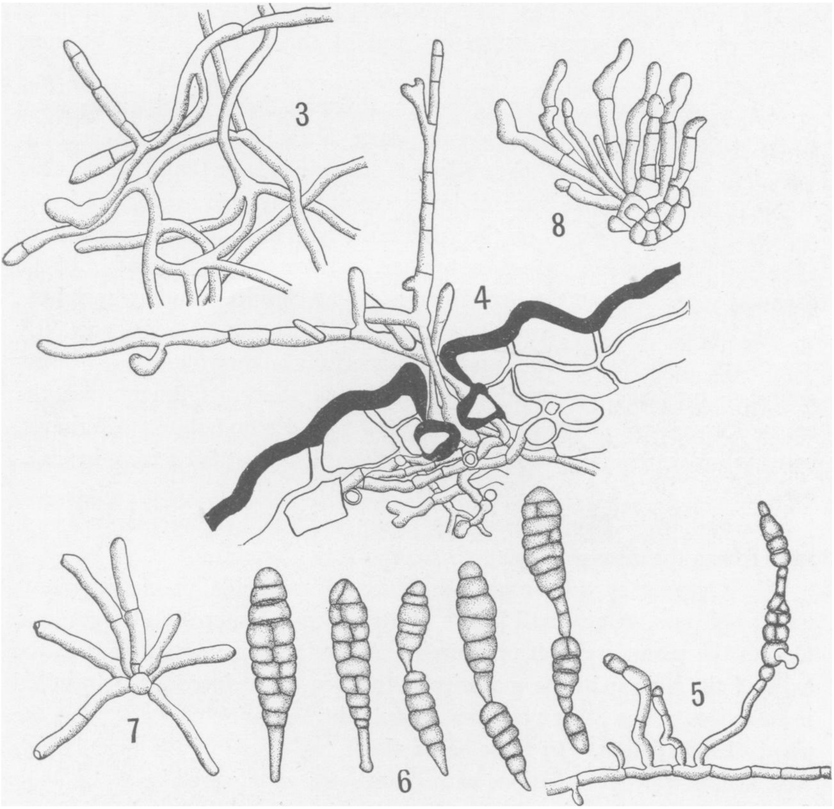

FIG. 3. Mycelium showing branching and septation.—FIG. 4. Showing mycelium below stoma and hyphae emerging through the stoma.—FIG. 5. Showing catenulate spores as borne upon hyphae.—FIG. 6. Spores showing shape, septation and catenulation.—FIG. 7. A young cluster of hyphae.—FIG. 8. An older cluster of hyphae.

Culture characters.—The fungus was grown upon many different media. Its characters upon these media have been noted elsewhere.[7]

The most important culture characters may be summarized as follows:

Upon media poor in available carbohydrates the mycelium was nearly hyaline, and the hyphae and spores pale; upon media rich in carbohydrates the mycelium, hyphae, and spores were very dark. Upon the natural medium the spores were more regular and uniform in shape and were much larger than upon artificial media.

The species of fungus.—Of the Alternarias there seems to be only one, *A. longispora* McAlph., growing upon members of the pink family (Caryophyllaceae),[8] and the description of this does not agree with ours in size, shape, or septation of its spores.

Therefore, unless an attempt be made to identify this form with some one of the seven or more species of Macrosporium infecting the pink family, a procedure which would be unjustifiable without resort to cross-culture inoculations and extensive study in artificial media, this form had best be designated as a distinct species, for which we propose the following name and description:

Alternaria Dianthi, n. sp.—Hyphae cespitose from stomata, amphigenous, dark brown, 1–4-septate, ascending, 1–25 from each stoma; conidia 26–123×10–20 μ, catenulate, clavate, tapering, base obtuse, dark brown, slightly constricted at the septa, transverse septa 5–9, longitudinal septa 0–5; spot ashen white, definite, subcircular.

On artificial media poor in carbohydrates mycelium lighter in color, spores lighter, smaller, and with fewer septa.

HABITAT: living leaves and stems of *Dianthus Caryophyllus*, Raleigh, N. C.—F. L. STEVENS AND J. G. HALL, *N. C. Agricultural Experiment Station, West Raleigh.*

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[7] STEVENS AND HALL, Variation of fungi due to environment, *ined.* Read before the Botanical Society of America at the Baltimore meeting, December, 1908.

[8] SACCARDO, Syll. Fung. **18**:638.